



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## SOLUTION BY THE PROPOSER.

Change the word square in the problem to rhombus. Take the horizontal line through the fixed vertex for the  $x$ -coordinate axis, and the vertical diagonal of the rhombus formed of the rods for the  $y$ -axis. Let  $x_1, y_1$  be the numerical values of the coordinates of each of the centers of the upper pair of rods;  $x_2, y_2$  of each of the lower pair;  $m$  the mass of each rod; and  $\alpha$  the value of  $\theta$  upon the cutting of the string.

We have  $x_1 = a \sin \theta, y_1 = a \cos \theta; x_2 = a \sin \theta, y_2 = 2a \cos \theta + a \cos \theta = 3a \cos \theta$ .

The energy equation for the motion is

$$2 \cdot \frac{1}{2} m \left( \dot{x}_1^2 + \dot{y}_1^2 + \frac{a^2}{3} \dot{\theta}^2 \right) + 2 \cdot \frac{1}{2} m \left( \dot{x}_2^2 + \dot{y}_2^2 + \frac{a^2}{3} \dot{\theta}^2 \right) = 2mgy_1 + 2mgy_2 + C;$$

but  $\dot{x}_1 = \dot{x}_2 = a \cos \theta \cdot \dot{\theta}, \dot{y}_1 = -a \sin \theta \cdot \dot{\theta}, \dot{y}_2 = -3a \sin \theta \cdot \dot{\theta}$ ; then

$$m \frac{4a^2}{3} \dot{\theta}^2 + ma^2 \left( \frac{4}{3} + 8 \sin^2 \theta \right) \dot{\theta}^2 = 8mag \cos \theta + C.$$

But  $\theta = \alpha$  when  $\dot{\theta} = 0$ ; then  $C = -8mag \cos \alpha$ , and the required angular velocity is given by

$$a(1 + 3 \sin^2 \theta) \dot{\theta}^2 = 3g(\cos \theta - \cos \alpha) \quad \text{or,} \quad \dot{\theta} = \sqrt{\frac{3g(\cos \theta - \cos \alpha)}{a(1 + 3 \sin^2 \theta)}}.$$

Also solved by J. B. REYNOLDS and F. L. WILMER.

## 2836 [1920, 273]. Proposed by W. V. N. GARRETSON, Rutgers College.

A ladder 40 feet long rests with one end on the ground against the foot of a building and the other end against the side of a second building directly across the street from the first. A second ladder 25 feet long inclines in a similar manner from the foot of the second building against the side of the first building, the two ladders crossing at a point 15 feet above the ground. How wide is the street?

## SOLUTION BY H. S. UHLER, Yale University.

Let  $x$  and  $y$  denote respectively the width of the street and the distance from the foot of the first building to the lowest point of the 15 ft. vertical.

From similar right triangles, we obtain immediately

$$\frac{15}{\sqrt{1600 - x^2}} = \frac{y}{x}$$

and

$$\frac{15}{\sqrt{625 - x^2}} = \frac{x - y}{x} = 1 - \frac{y}{x}.$$

Therefore, by addition,

$$\frac{15}{\sqrt{1600 - x^2}} + \frac{15}{\sqrt{625 - x^2}} - 1 = 0. \quad (1)$$

The solution of equation (1) may be effected advantageously in the following manner. Let the second fraction be represented by  $1/u$  so that

$$x = 5 \sqrt{25 - 9u^2}, \quad (2)$$

and equation (1) transforms into

$$\frac{\sqrt{3}}{\sqrt{13 + 3u^2}} = \frac{u - 1}{u},$$

or

$$3u^4 - 6u^3 + 13u^2 - 26u + 13 = 0.$$

Solving the last equation by Horner's method of approximation we obtain  $u = 1.612347811$ . The required result is now found by substituting in relation (2). It is  $x = 6.33050319$  ft.

Also solved by T. M. BLAKSLER, E. B. ESCOTT, LAURA GUGGENBUHL, W. W. JOHNSON, G. A. KNAPP, R. M. MATHEWS, H. L. OLSON, ARTHUR PELLETIER, J. B. REYNOLDS, and C. C. WYLIE.